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ABSTRACT

Results of a study attempting to verify the extent to which social background variables affect science achievement at multiple levels of analysis are reported. Patterns of home- and SES-influenced variables potentially explaining differences in individual achievement were examined in Hungary, New Zealand, and Australia to duplicate a previous study in which data from the United States, Sweden, and England were used. Independent variables included: (1) verbal ability, father's occupation, and number of books in the home as indicators of home background; (2) number of years of science study, number of hours of science instruction, and exploratory methods of learning and instruction as indicators of schooling characteristics; and (3) sex. The dependent variable was science achievement. (CS)

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A CROSS-NATIONAL STUDY OF THE MULTILEVEL EFFECTS
OF SOCIAL BACKGROUND ON ACHIEVEMENT

by

Liza C. Belandria

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This work attempts to verify the extent to which social background variables affect science achievement at multiple levels of analysis. From the methodological point of view, it illustrates the usefulness of multilevel analysis of data in discerning sources of differences in achievement otherwise lost in a single-level analysis.

In a previous study by Burstein, Fischer, and Miller (1979), data from three countries (U.S., Sweden, England) were used to examine the pattern of home- and SES-influenced variables potentially explaining differences in individual achievement. At another level, however, when aggregated and deviated from their means, these differential effects were attributed to the countries' socio-educational organization. Data were analyzed in a manner which estimated separate between-school and within-school effects. These analyses indicated that the effects of social background on achievement were varied across countries in predictable ways.

In contrasting the three countries' varying approaches to socio-educational egalitarianism, findings seemed to support the hypothesis that background effects within schools would be similar in all countries but that, between schools, they would differ in the direction predicted from the degree of centralization, selectivity and curricular uniformity in each of the countries studied.

The more centralized, less selective, and more curricularly uniform the country's policies and practices, as in the case of Sweden, the less the differences could be explained by home background. England and the U.S. showed stronger between-school effects consonant with higher community social stratification and curricular diversity. Yet, in none of the countries did egalitarian practices on a national level seem to alleviate the influence of background variables on achievement at the within-school level.

In an effort to augment the sample of countries used in the above-cited study, parallel data from the Six Subject Survey administered by the International Association for the Evaluation of Educational Achievement (I.E.A.) in Hungary, New Zealand, and Australia were analyzed. These three countries were chosen for the interest their socio-educational policies lend to our continuum of egalitarianism in educational opportunities. We chose developed countries with comprehensive systems of education: Hungary and New Zealand being highly centralized systems and Australia being decentralized and curricularly nonuniform. Their approaches to equality differ just as do the U.S., England, and Sweden, as previously studied. Based on general information

about their respective policies, we expected Hungary and New Zealand to manifest small between-school effects and Australia to behave like the U.S. and England.

The major analyses involved the application of the regression model of the form:

$$Y_{ij} = a + b_1 X_{ij} + b_2 \bar{X}_i + e_{ij}$$

where X_{ij} and $\bar{X}_i$ were vectors of individual-level regressors and their corresponding school-level averages.

Our purpose was to examine the effects of background on pupil performance at different levels. Recent advances in educational statistics tackle the confounded effects of individual and school effects by decomposing the total effects through between-school analysis of weighted school means and a pooled within-school analysis. The regression coefficient, b_{total} , from the individual-level model,

$$Y_{ij} = a_{\text{total}} + b_T X_{ij} + e_{ij},$$

is the weighted combination of the coefficients from the two levels, such that:

$$b_{\text{total}} = \eta_x^2 b_{\text{between}} + (1 - \eta_x^2) b_{\text{within}},$$

where η_x^2 is the correlation ratio of X , i.e., the proportion of variation in X which occurs between schools.

The estimation of the between-school effect in this study follows the Firebaugh model where $b_{YX \cdot \bar{X}} = b_{\text{within}}$ and $b_{Y\bar{X} \cdot X} = b_{\text{betw}} - b_{\text{within}}$.

This model controls for individual effects in the between-school effects, and by this, disentangles schooling from compositional influences.

The variables studied were: verbal ability, father's occupation, and number of books in the home as indicators of home background; number of years of science study, number of hours of science instruction, and exploratory methods of learning and instruction as indicators of schooling characteristics; and sex. The dependent variable was science achievement. The nonbackground variables were included for purposes of proper model specification.

A preliminary examination of the data through descriptive means and standard deviations showed the greatest amount of between-school homogeneity in achievement in Sweden and New Zealand. This lent credence to their hypothesized ability to homogenize achievement across schools, inspite of overall heterogeneity in the general population, especially in the case of New Zealand. At varying points in these analyses, Sweden and New Zealand had the least amount of variation in background variables at the school level and sometimes also at the student level. Australia and Hungary, on the other hand, behaved more similarly to the U.S. and England. Apparently, prior expectations about Hungary

were incorrect. In fact, while highly centralized, there exist definite practices of tracking and therefore selectivity and curricular non-uniformity.

Comparison of correlation ratios, i.e., the proportion of between-school to within-school variabilities, reinforced the patterns derived from the descriptive analyses. New Zealand was very similar to Sweden in having very low correlation ratios while Hungary and Australia were similar to the results obtained for the U.S. and England.

Between-school effects. Given the general patterns from the descriptive data, Hungary and Australia were expected to show the most susceptibility for achievement to be affected by mean background variables, following the patterns of the U.S. and England. This was confirmed by the results of the regression analyses.

In the cases of Hungary and Australia, the significant regression coefficients were for Verbal Ability (RWK) and Number of Books in the Home (BOKHOM); in the U.S. were for Father's Occupation (POPOCC) and No. of Books in the Home (BOKHOM); and in England was for No. of Books in the Home (BOKHOM). Note how the large variability in Verbal Ability (RWK) observed in England did not affect between-school differences in science achievement. Both New Zealand and Sweden were judged the most socio-culturally homogeneous in student population and school population in terms of Books in the Home (BOKHOM) and this variable was not a significant regressor of science achievement.

Given the heterogeneity we observed in Father's Occupation (POPOCC) composition in Sweden at par with the U.S. and Hungary, and in Verbal Ability (RWK) in New Zealand, the regression analysis reveals that these variables do not predict science achievement for Sweden nor New Zealand. We theorize that egalitarian efforts in Sweden (centrally controlled and equal resources) overcome possible differences caused by differences in affluence in communities across the country, as measured by Father's Occupation (POPOCC). On the other hand, here as in England, perhaps there is not too much income-differences among occupations. In contrast, New Zealand is able to smooth out ability and cultural differences symbolized in Verbal Ability (RWK), thus saying something in favor of their compensatory efforts for rural communities and for indigenous groups.

Hungary has reached the goal of equalizing opportunities for all occupational levels. Father's Occupation (POPOCC) is not a significant variable in spite of the wide variability between and within schools in this country. However, differences reflected in Books in the Home (BOKHOM) and Verbal Ability (RWK) proved to be significant in predicting science achievement. Rural-urban contrasts in Hungary are noteworthy and continue to preoccupy educational officials there. It seems that these differences are reflected between schools and are indeed influential.

Looking now at the instructional variables, the significant coefficient for the Number of Hours of Science Instruction (SCIINST) in the cases of Australia, Hungary, and England means that differences among schools in this variable explain differences in individual-level achievement in science. This reflects on tracking practices in these countries.

It is reasonable that Years of Science Study (YRSCI) is significant as a predictor of science achievement in Australia. Separate science subject study does not usually begin until age 15 and yet the decentralized curriculum reform has allowed the New South Wales science curriculum to cover all six years of secondary schooling, for example. In Australian schools there is large variability in Years of Science Schooling (YRSCI) in spite of a relatively small mean, unlike in the U.S. where the mean is small but so is the standard deviation.

We had described in the previous section that Hungary, Australia, and England varied the most in Number of Hours of Science Instruction (SCIINST). This variation turned out to be effective in differentiating among students in science achievement. In Hungary, science study opportunities are not uniform, and this explains significant differences in science achievement. The results for Australia and England are not unexpected.

Differences in Exploratory Methods of Learning and Instruction (EXPLORE) as an instructional technique was not important in predicting science achievement in any country. It was, in fact, negative in New Zealand and England. This is, of course, relative to the task and performance demand of the science achievement instrument.

Of interest, too, is the significant effect of the SEX variable in England, indicating that differential achievement in science is partly explained by the differences of male-female distributions among schools in this country. The effect in England is significantly different from that in the U.S. and Hungary which have negative coefficients. Note that New Zealand had the same between-school standard deviations as in England, but that in the former there was no significant effect on achievement. On the other hand, in the U.S. and Sweden the standard deviations were the smallest and yet these differences produced relatively large coefficients, though not significant. Interestingly, the effect is negative in the U.S. and positive in Sweden. Since Sweden's SEX between-school effect is similar to that of England, it also turned out significantly different from the U.S.'s.

Within-school effects. Analyses of within-school coefficients confirm the earlier-found similarity across countries of the relationship between background variables and science achievement. They were all found to have a significant effect on science achievement scores. We note, however, that within schools, the effect of Verbal Ability (RWK) is most powerful in New Zealand and the U.S. where the coefficients were larger than in all countries and least so in Hungary. And yet, it is

interesting to point out, Verbal Ability (RWK) had a significant between-school effect in Hungary but not in New Zealand and the U.S. Another interesting result is the reversal of signs for Father's Occupation (POPOCC) in Australia.

The instructional variable, Years of Science Schooling (YRSCI), has a significant positive effect on science achievement in England, Australia, and Sweden and a small but positive effect in the other countries. The Number of Hours of Science Instruction (SCIINST) have significantly positive effects in the U.S., Australia, and England, but negative effects in Hungary, New Zealand, and Sweden and significantly so in the last. Exploratory methods (EXPLORE) had a positive significant effect in Hungary but a significant negative effect in England and Australia.

Turning now to the nonbackground variable, SEX, the effects within schools are reversed in New Zealand, England, Australia, and Sweden. Whereas between-school effects tended to favor females in these countries, males are now favored within schools. In the U.S., where between-school effects tended to favor males, within-school effects continue to disfavor females, this time significantly. In Hungary, there is a definite advantage to being male, this time significantly, within schools. In England, females tend to achieve better in science if attending schools with larger female populations.

In general, the within-school effects for background variables were larger than the between-school effects. The size of these ratios and the occurrence of exceptions in Hungary and Australia put them, once more, in the same group as the U.S. and England.

This study is significant for its contributory evidence supporting the relationship of governmental socio-educational policies to the import of home background variables in explaining differences in achievement. These variables still operate at the within-school level even in countries that strive to uniformize educational opportunities. They have, however, differential influence at the between-school level, as a function of policies of centralization, non-selectivity, and curricular uniformity.

In addition, the application of a multilevel form of regression analysis illustrates the appropriateness of duly reflecting in the methodology the multiplexity of educational achievement. At the within-school level we measure the influences of individual differences on heterogeneity of opportunities. At the between-school level the separate effects of social forces can be estimated.

Table 1. Variables included in the regression analyses.

<u>Variables</u>	<u>Code</u>
Total science raw score	RSCI
Word knowledge test raw score	RWK
Sex of student (1 = male, 1 = female)	SEX
Ascending scale of student's report of father's occupation (1 = unskilled, manual, ..., 9 = professional, technical requiring higher education)	POPOCC
Ascending scale of student's report of number of books in the home (1 = none, 2 = 1-10, 3 = 11-15, 4 = 26-50, 5 = 51 or more)	BCKHOM
Years of study of general science, biology, chemistry, and physics (0 = did not take, 1 = 1 year, 2 = 1-3 years, 3 = 3-5 years, 4 = greater than or equal to 5 years)	YRSCI
Hours of instruction per week in general science, biology, chemistry, and physics (0 = did not take, 1 = less than 2 hours, 2 = 2-4 hours, 3 = 4-6 hours, 4 = greater than 6 hours)	SCIINST
Ascending scale of student's report of degree of use of exploration in science instruction; sum of scale responses on the following items (reversed items indicated by (-)):	EXPLORE
Science mostly learned through experiments (+)	
Science reading encouraged (+)	
Lab reports for homework (+)	
Science theory more than practice (-)	
Fieldwork encouraged (+)	
Participation in labs (+)	
Experiments in science lessons (+)	
Labs, student problems, teacher helps solve (+)	
Labs, devise own experiments (+)	
Labs, teacher problems, student solves (+)	
Labs, teacher questions on experiments (+)	

TABLE 2. MEANS AND STANDARD DEVIATIONS OF VARIABLES.

VARIABLES	MEANS ²						STANDARD DEVIATIONS ³											
							OVERALL SDs						BETWEEN-SCHOOLS SDs					
	US	ENG	SWED	HUNG	NZ	AUST	US	ENG	SWED	HUNG	NZ	AUST	US	ENG	SWED	HUNG	NZ	AUST
SEX	1.52	1.51	1.48	1.49	1.49	1.47	.50	.50	.50	.50	.50	.50	.15	.31	.13	.23	.31	.31
RWK	27.77	26.42	26.49	34.68	27.16	26.40	4.99	6.00	4.70	4.93	5.79	5.79	2.28	3.14	1.49	1.95	2.20	2.48
POPOCC ⁴	6.21	3.19	4.32	3.85	3.69	5.60	2.40	1.89	2.46	1.99	1.52	2.12	1.15	.98	1.04	1.06	.47	1.03
BOKHOU	4.57	4.31	4.62	4.85	4.59	4.48	.80	.95	.73	.81	.75	.90	.82	.37	.21	.43	.19	.28
YRSCI	2.33	4.85	5.18	9.56	2.55	2.94	1.35	1.98	1.62	1.44	1.41	1.98	.78	1.42	.62	.48	.67	1.36
SCIINST	1.60	2.56	3.11	3.15	2.45	2.60	1.21	1.49	1.17	1.38	1.26	1.74	.58	.79	.55	.95	.49	1.00
EXPLORE	9.96	10.47	8.21	13.2	10.78	9.98	3.42	2.77	2.51	3.07	2.71	2.79	1.59	1.01	.72	1.11	1.02	1.07
RSCI	34.11	33.85	33.72	40.29	35.46	36.55	9.47	11.57	9.37	10.53	10.65	11.10	4.57	6.79	2.71	5.52	3.77	4.65
N of SCHOOLS ¹	107	100	93	92	74	208												
N of STUDENTS ¹	1806	1770	1675	2753	1650	4053												

¹ STUDENTS WITH MISSING DATA ON ANY OF THE VARIABLES WERE ELIMINATED FROM THE STUDY, AS WELL AS STUDENTS FROM SCHOOLS WITH N<10.

² MEANS ARE WEIGHTED BY THE NO. OF STUDENTS FOR BETWEEN-SCHOOL ANALYSIS.

³ AS IN THE ORIGINAL BURSTEIN, ET AL. STUDY, SDs ARE BASED ON WEIGHTED MEANS SO THAT THE PROPORTION OF VARIATION BETWEEN SCHOOLS IS EQUAL TO THE SQUARED RATIO OF THE BETWEEN AND OVERALL STANDARD DEVIATION.

⁴ POPOCC IN NZ AND HUNG IS A 7-POINT SCALE.

TABLE 3. BETWEEN-SCHOOL CORRELATIONS, POOLED WITHIN-SCHOOL CORRELATIONS AND CORRELATION RATIOS FOR HUNGARY.

POOLED WITHIN-SCHOOL CORRELATIONS

BETWEEN-SCHOOL CORRELATIONS

VARIABLES	RSCI	SEX	RWK	POPOCC	BOKHON	YRSCI	SCIINST	EXPLORE
RSCI	.2750	-.2242	.4052	.2704	.3174	.0832	.0276	.0647
SEX	-.0424	.2115	.0570	.0268	.0770	.0011	.0398	-.0737
RWK	.6587	.2862	.1572	.2108	.2844	.0833	.0064	.0521
POPOCC	.6031	.2443	.7100	.2875	.3884	.0568	.0087	.0330
BOKHON	.6357	.2370	.7306	.7962	.2863	.1078	-.0444	.0666
YRSCI	.1908	.0748	.2378	.1795	.2127	.1100	.0756	.0125
SCIINST	.1036	.1789	.1498	.0381	-.0349	.1524	.4691	.0463
EXPLORE	.1674	.1911	.1843	.1661	.1330	-.0832	.0852	.1301

η^2 :
CORRELATION
RATIOS

NOTE: AS IN THE BURSTEIN, ET AL. STUDY, THE CORRELATION RATIO IS THE RATIO OF THE SUM OF SQUARES BETWEEN GROUPS TO THE TOTAL SUM OF SQUARES BETWEEN PERSONS FOR A SPECIFIC VARIABLE. IT REFLECTS THE PROPORTION OF THE OVERALL VARIATION THAT OCCURS AMONG SCHOOLS.

TABLE 4. BETWEEN-SCHOOL CORRELATIONS, POOLED WITHIN-SCHOOL CORRELATIONS AND CORRELATION RATIOS FOR NEW ZEALAND.

POOLED WITHIN-SCHOOL CORRELATIONS

BETWEEN-SCHOOL CORRELATIONS

VARIABLES	RSCI	SEX	RWK	POPOCC	BOKHOM	YRSCI	SCINST	EXPLORE
RSCI	.1255	-.2383	.5456	.1804	.2314	.0927	.0362	-.0297
SEX	-.5168	.3927	-.0172	-.0002	-.0183	-.1264	-.1011	.0176
RWK	.6357	-.1672	.1437	.1644	.1942	.0593	.0224	.0122
POPOCC	.2942	-.0717	.2597	.0940	.1615	.0230	-.0185	-.0508
BOKHOM	.4501	-.1750	.4245	.2534	.0642	.0376	.0100	.0007
YRSCI	.3097	-.3368	.2129	-.0295	.2566	.2232	.4878	-.0019
SCINST	.2383	-.3260	.0773	-.0657	.0707	.6295	.1488	.0656
EXPLORE	-.0950	.0518	-.0036	-.1375	-.1546	-.1269	.0535	.1417

η^2 :
CORRELATION
RATIOS

NOTE: SAME AS FOR TABLE 3.

TABLE 5. BETWEEN-SCHOOL CORRELATIONS, POOLED WITHIN-SCHOOL CORRELATIONS AND CORRELATION RATIOS FOR AUSTRALIA.

POOLED WITHIN-SCHOOL CORRELATIONS

VARIABLES	RSCI	SEX	RWK	POPOCC	BOKHON	YRSCI	SCINST	EXPLORE
RSCI	.3047	-.3194	.5057	.2309	.2999	.0118	-.0194	-.0609
SEX	-.5034	.1513	-.0461	-.0395	-.0833	.0320	.0096	-.0608
RWK	.7587	-.2803	.4428	.3012	.3337	-.0934	-.0856	-.1398
POPOCC	.6488	-.2506	.7302	.3208	.2982	-.2320	-.1319	-.1223
BOKHON	.7368	-.3114	.6896	.7146	.2450	-.0864	-.0912	-.0706
YRSCI	-.2845	.1504	-.3865	-.5872	-.2885	.5003	.5004	.1207
SCINST	-.2267	.1734	-.2155	-.3856	-.2259	.7566	.4064	.1268
EXPLORE	-.2216	.0623	-.3492	-.4162	-.1058	.4815	.2954	.2103

η^2 :
CORRELATION
RATIOS

NOTE: SAME AS FOR TABLE 3.

TABLE 6. SUMMARY OF CORRELATION DATA FOR SIX COUNTRIES.

Y = RSCI	BETWEEN-SCHOOL CORRELATIONS						WITHIN-SCHOOL CORRELATIONS					
	US	ENG	SWED	HUNG	NZ	AUST	US	ENG	SWED	HUNG	NZ	AUST
RWK	.737	.735	.363	.659	.636	.691	.979	.455	.455	.465	.546	.506
POPOCC	.610	.601	.221	.603	.294	.467	.151	.183	.164	.270	.180	.231
BOKHON	.672	.638	.169	.636	.450	.430	.185	.180	.196	.317	.231	.300
YRSCI	.214	.643	.047	.191	.310	.144	.177	.224	.203	.083	.093	.012
SCIINST	.024	.712	-.234	.104	.238	.286	.084	.231	-.213	.028	.026	-.019
EXPLORE	.267	.266	.080	.167	-.095	-.067	.053	-.027	-.070	.065	-.036	-.061
SEX	-.286	.058	-.161	-.042	-.517	-.191	-.207	-.229	-.232	-.224	-.238	-.319

TABLE 7. BETWEEN-SCHOOL AND WITHIN-SCHOOL EFFECTS OF FACTORS INFLUENCING SCIENCE ACHIEVEMENT SCORES (ASCI) OF 14-YEAR-OLDS IN SIX COUNTRIES.

BETWEEN-SCHOOL REGRESSION COEFFICIENTS						
VARIABLES	HUNGARY	N.ZEALAND	US	ENGLAND	SWEDEN	AUSTRALIA
SEX	-1.244	.238	-2.257	2.277*	2.125	.427
RWK	.492*	-.116	.097	.141	-.183	.298*
POPOCC	.332	.950	.465*	.147	-.217	-.326
BOKHOU	2.052*	1.260	2.376	2.457*	.118	1.516*
YRSCI	.116	-.421	.096	.005	-.326	-.820*
SCINST	.553*	.981	.367	1.644*	-.076	.746*
EXPLORE	.289	-.066	.135	-.119	.439	.163
WITHIN-SCHOOL REGRESSION COEFFICIENTS						
SEX	-5.789*	-4.768*	-3.682*	-4.718*	-5.183*	-4.655*
RWK	.625*	.941*	.848*	.720*	.791*	.818*
POPOCC	.396*	.497*	.315*	.314*	.304*	.588*
BOKHOU	1.658*	1.579*	1.264*	.953*	1.301*	1.153*
YRSCI	.169	.850	.049	.491*	.807*	.355*
SCINST	-.022	-.323	.545*	1.074*	-1.041*	.610*
EXPLORE	.123*	-.093	.077	-.182*	-.146	-.211*
R ²	.32	.38	.40	.45	.32	.36

* ($t \geq 1.96$)

TABLE 8. SIGNIFICANCE TESTS FOR DIFFERENCES IN BETWEEN-SCHOOL AND DIFFERENCES IN WITHIN-SCHOOL COEFFICIENTS ACROSS COUNTRIES.

T-STATISTICS FOR BETWEEN-SCHOOL DIFFERENCES IN COEFFICIENTS															
VARIABLE	H VS NZ	H VS US	H VS SW	H VS ENG	NZ VS US	NZ VS SW	NZ VS ENG	US VS ENG	US VS SW	ENG VS SW	Δ VS US	Δ VS ENG	Δ VS SW	Δ VS H	Δ VS NZ
SEX	-1.19	.67	-1.83	-2.83*	1.63	-1.01	-1.60	2.92*	2.13*	.08	-1.92	1.71	.98	-1.60	-.18
RWK	3.33*	2.28*	3.39*	2.13*	-1.39	.37	-1.61	.30	1.59	1.82	-1.63	-1.19	-3.06*	1.22	-3.05*
POPOCC	-.03	-.37	1.46	.41	-.21	1.02	.33	1.85	2.08*	.86	2.66*	1.17	.35	1.87	1.26
BOKHOM	.53	-.29	1.48	-.36	.73	.68	-.77	.07	1.69	1.70	.81	.85	-1.10	.53	-.17
YRACH	.98	.04	.86	.29	-.93	-.16	-.90	.22	.94	.72	2.61*	4.15*	1.25	2.16*	.78
SEINBT	-.65	.42	1.33	-1.87	.87	1.46	-.83	1.79	.81	2.58*	-.86	1.54	-1.74	-.54	.36
EXPLORE	1.26	.73	.45	.21	-.77	-1.40	.03	.94	.99	1.53	-.14	-.14	.88	-2.06*	-.36

T-STATISTICS FOR WITHIN-SCHOOL DIFFERENCES IN COEFFICIENTS															
VARIABLE	H VS NZ	H VS US	H VS SW	H VS ENG	NZ VS US	NZ VS SW	NZ VS ENG	US VS ENG	US VS SW	ENG VS SW	Δ VS US	Δ VS ENG	Δ VS SW	Δ VS H	Δ VS NZ
SEX	-2.49*	-4.05*	-1.11	1.65	-2.85*	.93	-.13	2.52*	2.79*	.71	1.91	-.10	-.98	-2.18*	-.21
RWK	-5.79*	-3.99*	-3.04*	-1.74	.91	2.65*	3.91*	2.12*	.87	1.16	.51	-2.02*	-.56	-4.16*	2.53*
POPOCC	-.57	.62	.67	.22	.69	1.12	.93	.17	.09	.24	-2.47*	-1.64	-2.41*	-1.51	-.55
BOKHOM	.21	1.13	.95	2.02*	.37	.69	1.65	.90	.10	.94	.46	-.61	.51	1.73	1.32
YRACH	-.80	.57	-3.56*	-1.81	.87	-2.00*	-.57	1.90	3.57*	1.51	-1.62	.70	2.67*	-1.13	-.02
SEINBT	1.15	-2.39*	4.84*	-4.62*	-2.10*	2.59*	-5.29*	2.15*	6.14*	8.15*	-.32	2.29*	-7.51*	-3.19*	-4.05*
EXPLORE	2.13*	.55	.34	3.09*	-1.66	.07	.77	2.63*	2.87*	.32	3.56*	.30	.08	1.11	3.06*

* (t ≥ 1.96)

TABLE 9. RATIOS OF THE COEFFICIENTS FOR EACH COUNTRY TO THE SMALLEST COEFFICIENT.

VARIABLE	BETWEEN-SCHOOL COMPARISONS						WITHIN-SCHOOL COMPARISONS					
	US	ENG	SWED	HUNG	NZ	AUST	US	ENG	SWED	HUNG	NZ	AUST
SEX	-9.50	9.58	8.94	-5.23	1.00	1.80	1.00	1.28	1.41	-1.57	-1.30	-1.26
RWK	1.00	1.45	-1.89	5.09	-1.19	3.07	1.35	1.15	1.27	1.00	1.50	1.31
POPOCC	3.16	1.00	-1.48	2.26	2.38	-2.22	1.04	1.12	1.00	1.30	1.63	1.93
BOOKLOW	20.14	20.82	1.00	17.39	10.68	12.85	1.33	1.00	1.37	1.74	1.66	1.19
YRSCI	19.20	1.00	-65.20	23.16	-84.14	164.00	1.00	10.02	16.47	3.45	7.13	7.24
SCINST	-4.83	-21.70	1.00	-7.27	-12.90	-9.82	-24.77	-48.82	47.32	1.00	14.68	-27.73
EXPLORE	-2.04	1.80	-6.63	-4.37	1.00	-24.70	1.00	-2.36	-1.90	1.60	-1.21	-2.74

Table 10. Ratios of pooled within-school to between-school coefficients for home background variables across countries.

VARIABLES	US	ENGLAND	SWEDEN	HUNGARY	N. ZEALAND	AUSTRALIA
RWK	8.69*	5.11*	-4.32*	1.27	-8.12*	1.92*
POPOCC	.68	2.32	-1.40*	1.19	1.42	-1.80*
BOKHOM	.53	.39	11.03	.80	1.25	.75

* Comparisons for which the differences in between-school and within-school coefficients exceed twice their pooled standard error.

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